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SEMICONDUCTOR DEVICE

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[There are no amendments to this patent.]

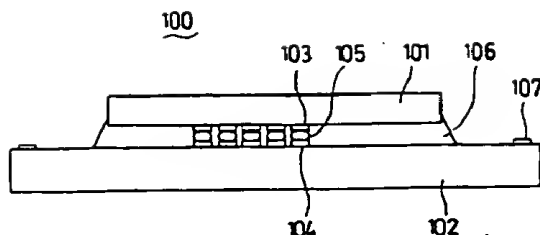
Abstract

Purpose

To provide an emulator with high-speed and high functionality without increasing the number of development steps.

Constitution

A CPU core, a peripheral circuit, an internal ROM and an internal RAM are formed in microcomputer chip 101. An emulation control circuit that controls the entire emulation is formed on emulation function chip 102. A first electrode pad 103 formed on the functional surface of microcomputer chip 101 is electrically connected to a second electrode pad 104 on the functional surface of emulation function chip 102 by means of a connecting bump 105, and with both [pads] connected, microcomputer chip 101 and emulation function chip 102 are modularized by means of insulating resin 106.



Claims

1. A semiconductor device characterized in that it is provided with a first semiconductor chip that comprises a microcontroller chip having a CPU core, a peripheral circuit, and an internal RAM, but not having an emulation function element, and a second semiconductor chip having a surface area larger than said first semiconductor chip and having an emulation function element;

and the electrode pad of the first semiconductor chip and the electrode pad of the second semiconductor chip are electrically connected by means of a bump.

2. A semiconductor device characterized in that it is provided with a first semiconductor chip that comprises a microcontroller chip having a CPU core, a peripheral circuit, and an internal RAM, but not having a nonvolatile read/write memory, and a second semiconductor chip having a surface area larger than said first semiconductor chip and having a nonvolatile read/write memory;

and the electrode pad of the first semiconductor chip and the electrode pad of the second semiconductor chip are electrically connected by means of a bump.

3. A semiconductor device characterized in that it is provided with a first functional element formed on a first semiconductor chip and a second functional element formed on a second semiconductor chip,

and for said first semiconductor chip and said second semiconductor chip, the functional surface where said first functional element is formed and the functional surface where said second functional element is formed are provided facing one another,

and the first electrode pad of said first semiconductor chip and the second electrode pad of the second semiconductor chip are electrically connected by means of a bump,

and said first electrode pad is formed above the region where said first functional element is formed in the same layer as the highest wiring layer of the wiring layers that constitute said first functional element.

4. The semiconductor device of Claim 3, characterized in that said first electrode pad is formed above the peripheral region of the functional block that constitutes said first functional element, and performs, with respect to said functional block, signal input/output of the first semiconductor chip from/to the outside.

5. The semiconductor device of Claim 3, characterized in that said first electrode pad is formed above the internal region of the functional block that constitutes said first functional element, and performs, with respect to said functional block, signal input/output of the first semiconductor chip from/to the outside.

6. The semiconductor device of Claim 4 or 5, characterized in that said first semiconductor chip is a microcontroller chip, and said first functional block is a CPU core.

7. The semiconductor device of Claim 3, characterized in that said first electrode pad is formed above the signal input/output circuit element that constitutes said first functional element.

8. The semiconductor device of Claim 3, characterized in that said first semiconductor chip is a microcontroller chip having a CPU core, a peripheral circuit, and an internal RAM, but not having an emulation function element, and said second semiconductor chip has an emulation function element.

9. The semiconductor device of Claim 3, characterized in that said first semiconductor chip is a microcontroller chip having a CPU core, a peripheral circuit, and an internal RAM, but not having a nonvolatile read/write memory, and said second semiconductor chip has a nonvolatile read/write memory.

10. A semiconductor device characterized in that it is provided with a semiconductor chip on which is formed a functional element and with a circuit substrate on which said semiconductor chip is mounted face down, and the first electrode pad of said semiconductor chip and the second electrode pad of said circuit substrate are electrically connected by means of a bump,

and said first electrode pad is formed above the region where said first functional element is formed in the same layer as the highest wiring layer of the wiring layers that constitute said first functional element.

11. The semiconductor device of Claim 10, characterized in that said first electrode pad is formed above the peripheral

region of the functional block that constitutes said first functional element, and performs, with respect to said functional block, signal input/output of said semiconductor chip from/to the outside.

12. The semiconductor device of Claim 10, characterized in that said first electrode pad is formed above the internal region of the functional block that constitutes said first functional element, and performs, with respect to said functional block, signal input/output of said semiconductor chip from/to the outside.

13. The semiconductor device of Claim 11 or 12, characterized in that said semiconductor chip is a microcontroller chip, and said functional block is a CPU core.

14. The semiconductor device of Claim 10, characterized in that said first electrode pad is formed above the signal input/output circuit element that constitutes said functional element.

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